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NEW DEMONSTRATION OF PROP. K., EUCL., B. VI.

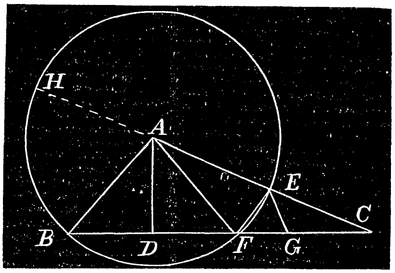
BY W. H. WEST, EX SUPREME JUDGE OF OHIO.

Theorem. In any plane triangle, the base is to the sum of the other two sides as the difference of those sides is to the difference of the segments of the base formed by a perpendicular from the angle opposite the base.

Demonstration.—Let ABC be the triangle, BC its base, AD the perpendicular upon it. Then will

$BC : AC+AB :: AC-AB : CD-BD$

With A as a center and radius AB describe an arc cutting BC in F and AC in E. Join E and F, and from E draw EG making $\angle GEC = \angle ABC$.



It is plain that $AFB+AFE=CEG+AEF$; hence $\angle FEG=\angle EFG$, and $EG = FG$.

From the similar triangles CEG and ABC,

$$CG+GE : CA+AB :: CE : BC.$$

But $CG+GE=CG+GF=CF=CD-BD$; and $CE=CA-AB$; hence the proportion

$$BC : AC+AB :: AC-AB : CD-BD.$$

If the given triangle be obtuse, as AFC, the second term of $CD + BD$ is to be regarded as negative, and we have

$$CF : CA+AF :: CA-AF : BC.$$

If ABC be a right angle, AF and AB become AD, CEG will be a right angle, and $CE+EG$ will $= CD$; then

$$CD : CA+AD :: CA-AD : CD,$$

or

$$AD^2+CD^2 = AC^2.$$

[Produce CA to meet the circumference in H. Then, by Eucl. B. III, Prop. 36, Cor. 1, $CH\,(=CA+AB) \times CE = CB \times CF$, or

$$CB : CA+AB :: CA-AB : CD-BD.$$—Ed.]

CORRECTION.—Mr. Adcock makes the following correction in his solution of Prob. 352:

On page 160, the last line should read

$$\int_0^{\frac{1}{2}\pi}\frac{4\varphi d\varphi}{2\pi}\div\int_0^{\frac{1}{2}\pi}d\varphi=\left[\frac{2\varphi^2}{2\pi\varphi}\right]_0^{\frac{1}{2}\pi}=\frac{1}{2}.$$